59TH CONGRESS, 1st Session. } HOUSE OF REPRESENTATIVES. { REPORT No. 3213.

IMPROVEMENT OF THE MOUTH OF THE COLUMBIA RIVER.

APRIL 13, 1906.—Committed to the Committee of the Whole House on the state of the Union and ordered to be printed.

Mr. JONES, of Washington, from the Committee on Rivers and Harbors, submitted the following

REPORT.

[To accompany H. R. 17987.]

The Committee on Rivers and Harbors, to whom was referred the bill (H. R. 17987) making an appropriation for the improvement of the mouth of the Columbia River, having had the same under consideration, beg to submit the following report:

The project for the improvement of the mouth of the Columbia River consists of the construction of a single jetty extending seaward from the south side of the entrance. Work was begun in 1885 and continued until 1895, when the jetty extended 4¼ miles.

Another survey was provided for in the river and harbor act of March 3, 1899, and a project for the improvement was referred to a board of engineers by the act of June 13, 1902, which recommended a further extension of 2½ miles. This project was adopted and is now under way.

The jetty is constructed of rock, and to build it a trestle must be erected seaward to support the railroad track upon which the rock is carried out and dumped along the line of the jetty.

At the beginning of the fiscal year 1903–4, as the commencement of the 1903 project to extend the old jetty 2½ miles farther out, the old trestle was repaired and put in shape out to the end of the old jetty, 25,000 feet from shore, and by September it had been extended a distance of 564 feet. During the following February and March the storms destroyed 972 feet. This was repaired, however, and on May 2, 1904, the work of extending the jetty track was begun, and by the end of August it had been carried 7,576 feet beyond the old jetty. During the year 1904 this trestle was destroyed, and an entirely new trestle and tramway had to be built for the work of 1905. The trestle for 1905 is 10,547 feet long and begins on the sands of Clatsop Spit near a point 21,035 feet and extends to a point 31,582 feet from the root of the jetty at Fort Stevens.

With the $700,000 provided for in the last river and harbor act this trestle has been built and 5,624 feet of jetty has been raised about 3 feet above mean low water, while about 1,000 feet of the outer end of the jetty and about 4,000 feet near Clatsop Spit have been raised about half the required height. This 5,000 feet of jetty, however, can not be completed until more money is made available, and there is no assurance that the present trestle will be safe for transporting stone after July 1 of this year.

Major Roessler, the engineer in charge, says:

> The disasters of the year have been studied, and it is the opinion of men of good judgment who have lived upon the work from day to day for a number of years that the trestle will not be safe for transporting stone after next July if, indeed, it stands that long.

Major Langfitt, a member of the Board of Engineers and for many years in charge of the work at the mouth of the Columbia River, appeared before the committee and stated that, in his opinion, the present trestle would last long enough to complete the jetty if the money should be made immediately available so that work could be commenced by May 1. It has been found that the piling of these trestles will last only about a year for the reason that the teredo works on them very rapidly. Heretofore they have not seemed to affect the piling nearer shore but, as the trestle has gone out into salt water, it seems that the fresh water is not sufficient to prevent their ravages.

The engineer in charge, Major Roessler, says:

> The chief cause of this great loss of trestle is, in my opinion, the honeycombing of the piles by teredo, which has been found to be ferociously active along the line of the jetty, so destructive in fact that many piles have become brittle as pipestems in a year's time.

To complete the jetty to the length of the present trestle the engineers estimate the cost to be $400,000 if done at once. If this sum is not made available now the present trestle will go out and, when money is made available, it will cost much more to bring the jetty up to grade than if done at the present time. A trestle can not be built on the rocks, but will have to be constructed alongside. The scour alongside the partially constructed jetty will make the trestle much more expensive and much of the enrockment will be wasted, as it will have to be built up on the side; in fact, almost an entirely new jetty will have to be built along that part now incomplete.

General Mackenzie says:

> It is my opinion that unless an appropriation of $400,000, in addition to the $300,000 to be provided in the sundry civil bill, be made available at the present session of Congress great loss to the work will result. I can not measure this loss in dollars and cents. It will amount not simply to a delay in the work, but may result in an enforced duplication of a large part of the portion now built, unless that portion can be completed during the life of the present jetty trestle.

Major Langfitt stated to the committee that in his judgment the appropriation and expenditure of $400,000 now would save to the Government at least $300,000 or $400,000.

It seems to your committee that the foregoing facts present a situation that exists nowhere else in the country. It stands by itself. It therefore appears to your committee to be such an emergency as warrants special action by Congress, and we recommend the passage of this bill.

We submit as a part of this report correspondence with and reports from the War Department.

[Document No. 3, 59th Congress, 1st session, Committee on Rivers and Harbors, House of Representatives, U. S.]

WAR DEPARTMENT,
Washington, March 2, 1906.

MY DEAR MR. BURTON: This Department received, in November last, a communication from the Secretary of the Portland Board of Trade, quoting a resolution of said board authorizing Hon. Charles H. Carey to act for the board at the National Capital during the present session of Congress. A letter was also received, dated November 24 last, from the attorney of the Chamber of Commerce of Portland, inclosing copy of a communication addressed to you under date of November 4, 1905, regarding the importance of continuing and completing certain jetty work at the mouth of the Columbia River during the present year without the interruption which would necessarily result from lack of an adequate appropriation.

In connection with these letters I have the honor to transmit herewith reports from the local engineer officer, Major Roessler, regarding the condition on the work referred to, with estimate of the further cost; also a memorandum of yesterday's date from the Chief of Engineers, United States Army, reviewing the matter and urging the importance of securing an appropriation sufficient for the uninterrupted continuance of the work to completion.

In connection with the foregoing I have this day transmitted to the chairman of the Committee on Commerce, United States Senate, a further report of the Chief of Engineers, the same being in response to a call from the committee for a report on a proposed amendment to the pending sundry civil bill, to be presented by Senator Fulton, carrying an appropriation of $400,000 for continuing the said work.

From all the information available, it would seem that the appropriation recommended by the engineer authorities, and so earnestly urged by the people of Portland, is absolutely needed as a matter of economy as well as utility in order to protect the work already done on this important project.

Very respectfully,

WM. H. TAFT,
Secretary of War.

P. S.—Photographs showing the destructive work of the teredo are also inclosed herewith.

Hon. THEODORE E. BURTON,
Chairman, Committee on Rivers and Harbors,
House of Representatives.

(Inclosures: 3688–13, 14, 15, and 16.)

UNITED STATES ENGINEER OFFICE,
Portland, Oreg., December 2, 1905.

Brig. Gen. A. MACKENZIE,
Chief of Engineers, U. S. Army,
Washington, D. C.

GENERAL: 1. I have the honor to submit the following progress report of the work on south jetty, mouth of Columbia River. The report will be limited to questions affecting progress and cost and to a statement of the amount of funds that can be advantageously expended in 1906. At my request Col. W. H. Heuer, Corps of Engineers,

Division Engineer, Pacific Division, visited Fort Stevens November 13, 1905, for a conference on matters pertaining to the jetty and for an inspection of the work in progress. What is hereafter said is intended to be in harmony with the conclusions reached at our conference and is believed to be so.

MAPS.

2. Map "A" herewith shows the location and length of the jetty as completed in 1895, the extensions upon which efforts have been concentrated since 1902, and the proposed further extension upon which no work has yet been done. The soundings are those taken in June of this year. Map "B" gives the same information upon the survey of 1902, whose soundings were used by the engineer board of 1903 in making up its estimates of quantities and cost. Tracing "C" shows the profile of the 1902–1905 portion of the jetty, and tracing "D" gives a profile cross-section of a typical section, whereby the influence of scour on both sides of the jetty in increasing the quantities of rock required in the cost of the jetty over the board's estimate is diagrammatically illustrated. Two photographs illustrating ravages of the teredo are also inclosed.

ANALYSIS OF TRACING "D."

3. Tracing "D" is worthy a close observation, as it indicates the extent to which scour has taken place on both sides of the jetty under current and wave action. In 1902, at this section, the bottom was fairly level, with depths of 27 to 28 feet at mean lower low water. In 1903 and 1904 the trestle was built out to and beyond it, and, following the plan of the board, only as much rock was put in immediately after the construction of the trestle as was deemed necessary to prevent excessive scour around the piles and to give some support to the trestle. Later, more rock was placed, and a section of greater or less fullness had been made when a portion of the trestle was destroyed by a storm in October of 1904, and further progress suspended for the time being. The jetty remained in this uncompleted state until a new tramway could be erected. For obvious reasons, the trestle could not be reestablished over a rock foundation, and a location was selected at the seaside of the incomplete jetty and as close to the latter as it was possible to get reasonable penetration for the piles. In doing this it was possible, by dumping the stone northward of the tracks, to bring the enrockment of 1904 within the completed section as it would be made from the new trestle.

4. The first set of soundings across the jetty at the section in question was made shortly after the completion of the trestle in that vicinity, in June, 1905. Referring to the drawing, this section is shown by the full line. The significant feature of this profile is the deep scour which it indicates on the channel side, this scour being 10 feet at the top of the enrockment and 20 feet at a point 40 feet from the toe. In other words, depths of 38 to 48 feet were there found where a depth of 28 feet was indicated at the time the original estimate was made. A similar but less active erosion is noted in the sea face of the jetty, the scour being about one-half as great as on the channel side.

5. By July 30 the section had been raised to a height of 5 feet above low water and so remained until struck by the storms early in October.

The effect of these storms was to knock off the entire top of the section to a depth of 7 feet below low water, the rock so displaced being tumbled down the slopes of the jetty. The enrockment has been again raised to the level of low tide and has remained at this level during a succession of heavy gales following the storms of early October. The completed section of July 30, and the form of the section after the October storms, are shown by the broken and dotted line on the tracing.

6. As the conditions which have been described for the type section have been found to exist in lesser or greater degree all along the portion of the jetty under discussion, two important conclusions may be drawn: First, the quantity of rock required to bring the jetty to the level of low water exceeds the amount upon which appropriations have heretofore been based; second, that groins on both sides of the jetty to neutralize the disturbing forces and to induce deposits, however costly they may be, may have to be built unless further soundings taken after this winter's storms should show a deposit on both sides of the finished portions of the jetty, or at least should reveal no worse condition than is indicated by the type section.

DOUBLE-TRACK TRAMWAY AND DIFFICULTY OF MAINTAINING IT.

7. The maintenance of a double-track tramway beyond Clatsop Spit has become a matter of serious consequence, as upon it depends the rate at which the jetty can be extended, and to a large extent the ultimate cost of the completed work. That portion of the original trestle of 1895, which is imbedded in and lies behind Clatsop Spit, is no longer subjected to the violence of the seas or to the ravages of the teredo, and can be maintained with ease, but the maintenance of the portion lying seaward of the spit has proven to be an exceedingly difficult matter. It will be appropriate to describe some of the difficulties encountered.

8. In beginning the work of extending the old jetty 2½ miles seaward, under the project of 1903, the first thing done was to repair all of the old trestle which was still left standing and to replace, by a new trestle, so much of the old as had been destroyed by the seas.

9. At the beginning of the fiscal year 1903–4 the trestle had been repaired and replaced to the end of the 1895 jetty at station 25,000 feet from shore, and by September had been extended a farther distance of 564 feet.

10. During the storms of February and March following, a total of 972 feet of trestle was destroyed by the breakers.

11. By the end of April the damage had been repaired by a new trestle at the gap. On May 2, 1904, the work of extending the jetty track was begun, and by the end of August had been carried a total of 7,576 feet from the end of the old jetty. To give it the necessary strength to resist the heavy seas to which it would be exposed, the trestle was strengthened near the outer end by batter piles on one side and by guys secured to anchor piles on the other.

12. During a gale on October 10, 1904, about 1,000 feet of the trestle built in 1903, and therefore but a little over 1 year old, was destroyed and a still greater length of older trestle was carried out. Further destruction of the 1903, and some of the 1904, trestle occurred on December 29, 1904, during a two-days' gale, by which time the trestle tramway had been so completely broken up as to necessitate the building of entire new trestle and tramway, beginning at the shore, for the work of 1905.

LOSSES OF TRESTLE ATTRIBUTED LARGELY TO TEREDO.

13. The chief cause of this great loss of trestle is, in my opinion, the honeycombing of the piles by the teredo, which has been found to be ferociously active along the line of the jetty, so destructive in fact that many piles have become brittle as pipestems in a year's time. The most impressive object lesson of the effects of the teredo attacks upon untreated piles in this locality was an occasion when a detached section of the 1904 trestle collapsed completely soon after the rails were taken off. The photographs herewith illustrate the worm-eaten appearance of a pile from the above-mentioned piece of trestle, which had been in the water but little more than one year.

TRESTLE OF 1905.

14. The trestle of 1905 is 10,547 feet long, and begins on the sands of Clatsop Spit near a point 21,035 feet and extends to a point 31,582 feet from the root of the jetty at Fort Stevens. It represents the work of one pile driver from May to September, 100 linear feet per working day being the maximum rate at which the pile work can be built. In the outer portion the piles are larger, longer, and of deeper penetration than any heretofore used, in order to give a trestle of greater strength and stability and with better hold upon the sandy bottom.

15. Realizing from the experience of 1904 that untreated piles would give a short-lived trestle, it was the intention of the office to use piles covered first with hot tar and then with tarred canvas as the best, and in fact the only kind of treated pile it was practicable to obtain in the quantity required and at the rate required. Piles so prepared were used in the first 7,139 feet of the trestle, but in the outer 3,408 feet untreated piles were reluctantly accepted to avoid certain delays that would have followed the use of tarred piles throughout.

PROBABLE LIFE OF 1905 TRESTLE.

16. How long it will be safe to run loaded trains over this trestle is a question which has had careful and constant consideration for a month and more. Piles which have been loosened by wave action and driven ashore have been sawed and the ravages of the teredo noted. The disasters of last year have been studied and it is the opinion of men of good judgment who have lived upon the work from day to day for a number of years that the trestle will not be safe for transporting stone after next July, if, indeed, it stands that long. That is also my own judgment. Our views may be too conservative, but they are in accord with the experience of the past two years. The tarred piles are an untried experiment in this locality, and while they will undoubtedly show a longer life than untreated timber in places where the tarred covering was not liable to be rubbed off, the great majority of them exposed too many bare spots to the teredo where the tarred covering has been rubbed off by the dumping of stone around them to justify much hope upon their lasting much longer than untreated timber.

NEED FOR AN EMERGENCY APPROPRIATION.

CONCLUSION.

17. In view of the foregoing discussion and of the fact that if the enrockment under the present trestle is not completed from this trestle it will not be possible to again erect a trestle along the same line,

and that it will then not be possible to complete the jetty at the subgrade points without building a loop jetty at great cost, *it is evident that the situation presents an emergency which should be provided for by a special appropriation of sufficient amount to complete the enrockment along the entire length of the threatened trestle, which appropriation should be made available in time to permit contracts to be made for an early start in the spring when good weather sets in.* The amount required is estimated at $400,000, and is determined as follows:

18. The work now in progress is carried on under the appropriation of $400,000 contained in the river and harbor act of March 3, 1905, and an appropriation of $300,000 to be made in the next sundry civil bill. Before the end of December of this year all the stone will have been purchased which can be paid for out of funds in hand, after reserving a sufficient amount to care for the plant another year, and certificates will have been issued for all, or nearly all, of the $300,000 to be appropriated in the sundry civil bill. With the money so expended and pledged, the jetty will have been raised to a height of 3 feet above mean lower low water for a distance of approximately 5,624 feet between a point 24,890 feet (bent 1,470) and a point within 1,000 feet of the end of the trestle, or 30,522 feet from Fort Stevens. To complete the jetty under the trestle will require the raising of 1,000 feet at the outer end, which is now at about half height, and the filling in of a gap of approximately 4,000 feet near Clatsop Spit. To fill these and to provide 50,000 tons for raising any portion of the completed work that may be lowered by the winter's storms will require 290,000 tons of rock, which, at $1.30 per ton, allowing $23,000 for contingencies, will cost the estimated sum of $400,000.

EXTENDING JETTY BEYOND THE END OF PRESENT TRESTLE.

19. For further extension of the jetty beyond the end of the present trestle the following programme of operations was discussed and agreed upon at the conference with Colonel Heuer:

(*a*) To use creosoted piles throughout, as it is known that these will last three or four years. The use of such piles may require the erection of a creosoting plant in case the timber can not be obtained in requisite quantities and at satisfactory prices from commercial owners.

(*b*) To build a trestle parallel with the present jetty to a point near the end of the finished enrockment and then come in onto the line of the jetty on a curve, thence continuing on the line of the jetty. Such a trestle will require at least four months to build out to the point where the enrockment would begin and will, therefore, consume the large and better part of a season's work. If funds were appropriated in time to begin such a trestle early next season the approach could be built and enough rock placed in 1906 to permit the south jetty, under average conditions, to be completed, or nearly so, before the end of 1907. In other words, it will require full two working seasons to complete the south jetty after the funds have been appropriated and preparations therefor completed.

(*c*) It is further proposed in future work to carry the trestle forward only as rapidly as it can be followed by the enrockment, the completed sections of the jetty being always kept about 1,000 feet back of the end of the trestle.

(*d*) It is further proposed to use in the bottom of the jetty as foundation a large amount of small rock, from the size of one's fist to a

hundred pound weight, in the belief that it will be effective in minimizing scour under the trestle as the piles are driven and in preventing an undermining of the completed jetty by current or wave action.

ESTIMATE OF COST FOR COMPLETING JETTY.

It is difficult to estimate the probable cost of a work beset with such tremendous obstacles as this one is, and the best that can be done is to approximate in the light of the experience so far had. Should the survey of next spring show groins to be unnecessary, and should we be able to build a trestle that will be strong enough to resist the force of the seas, and last long enough to finish the entire work, as we believe we can do with creosoted piles, it is estimated that, in addition to the funds in hand and the $300,000 to be provided in the next sundry civil bill, the sum of $1,900,000 will be required to complete the jetty to the projected length of 6,600 feet beyond the end of the present trestle. After what has already been said, and bearing in mind that even creosoted piles can not last more than three or four years, it is perhaps unnecessary to dwell on the very great advantages of doing this work as a continuous job, under a continuing contract.

21. Of the $1,900,000 required, the most urgent part is the item of $400,000 for completing the enrockment under the present trestle, a d this would be expended before August of 1906, if present plans can be carried out. To continue the work by erecting a two-mile trestle of creosoted piles parallel to the present trestle, and to further extend the enrockment during the remainder of that season, the further sum of $600,000 could be expended during the season of 1906, under favorable conditions, leaving $900,000 to be provided for the working season of 1907.

Very respectfully, your obedient servant,

S. W. ROESSLER,
Major, Carps of Engineers, U. S. Army.

(Six inclosures; maps in separate package.)
Through Col. W. H. HEUER,
Corps of Engineers, U. S. Army,
Division Engineer, Pacific Division,
San Francisco, Cal.

[First indorsement.]

UNITED STATES ENGINEER OFFICE,
PACIFIC DIVISION,
San Francisco, Cal., December 6, 1905.

1. Respectfully forwarded to the Chief of Engineers, U. S. Army.

2. The probability of destruction of trestle due to the teredo combined with violent wave action is so great that, to make jetty work at that locality economically practicable, the work should be rushed, and this can only be done when funds are available.

3. The district officer in paragraphs 20 and 21 of within report, estimates that, in addition to the funds now appropriated and available, it will require approximately $2,200,000 to complete the jetty, and that if this money were available the work might be completed at the close of the working season of 1907. The estimates which are now before Congress are for the fiscal year ending June 30, 1907. From

a study of Major Roessler's report, it is inferred that if an emergency appropriation of $400,000 be made at this session of Congress, in addition to the $300,000 which is expected in the sundry civil bill, that the aggregate of these amounts will only suffice to continue the work until the close of the working season of 1906, at which time, if the funds should be exhausted, there would be necessary to complete the jetty extension $1,500,000 (based on Major Roessler's estimate), none of which (even if it should be appropriated in the session 1906–7) would probably be available until March, 1907. It is evident that if the money were then appropriated the jetty could not be completed in the calendar year 1907, on account of the valuable time that would be lost in building the long trestle which will be required to reach the root of the proposed extension, and in making the necessary contracts for the large volume of rock required in the extension. For this reason and principally to make certain of the reasonable and economical completion of the work in 1907 it is believed that the money estimated for, viz, $1,900,000+the $300,000 supposed to be in the sundry civil bill, should be asked for now, instead of the $400,000 emergency fund referred to in paragraphs 17–18 of within report.

4. Creosoted piles will or may resist the action of the teredo for several years, but the tensile strength of piles thus treated is so much impaired by the steaming process that it is doubtful if in the very deep water on the extension of the jetty they will be strong enough to resist the violent wave action to which they will be subjected. As a matter of detail and precaution it might be well to consider the advisability of placing in the extension six piles to a bent, each bent to consist of three creosoted and three untreated piles.

W. H. Heuer,
Colonel, Corps of Engineers, Division Engineer.

Six inclosures (two photographs herewith and four drawings and blueprints in separate roll).

War Department,
Office of the Chief of Engineers,
Washington, December 13, 1905.

My Dear Mr. Burton:

* * * * * * *

2. In regard to the mouth of the Columbia River, the situation is truly a difficult one. A report from Major Roessler has just been received and will be forwarded as soon as possible in answer to the committee's call for information. Broadly speaking, the facts are that the trestle is indispensable; that it can not be trusted to last more than a year after it has been put in; that the rebuilding is costly, and in time will become impracticable owing to the fact that each renewal must be along a new line; and that present funds will not suffice to put in the trestle and push the work rapidly afterwards. I know of no case where rapidity of execution, once the work has been begun, is more desirable from the point of view of economy. I can not say, however, that the loss by delay now would be irretrievable, or that

the work will be absolutely ruined by a temporary discontinuance; only that a delay would occasion more serious results than in the case of most improvements.

Very respectfully,

A. MACKENZIE,
Brig. Gen., Chief of Engineers, U. S. Army.

Hon. T. E. BURTON,
Chairman, Committee on Rivers and Harbors,
U. S. House of Representatives.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, December 19, 1905.

MY DEAR MR. BURTON: In response to your letter of the 18th instant I am sending you inclosed a copy of a report received from Maj. S. W. Roessler, Corps of Engineers, in regard to the mouth of the Columbia River, and of the remarks of the division engineer indorsed thereon.

Very respectfully,

A. MACKENZIE,
Brig. Gen., Chief of Engineers, U. S. Army.

Hon. T. E. BURTON,
Chairman, Committee on Rivers and Harbors,
U. S. House of Representatives.

(Copy of 7523/371 accompanying.)

UNITED STATES ENGINEER OFFICE,
Portland, Oreg., January 16, 1906.

Brig. Gen. A. MACKENZIE,
Chief of Engineers, U. S. Army,
Washington, D. C.

GENERAL: 1. In my report of December 2, 1905, on the jetty work at the mouth of the Columbia River the following remark was made:

> It is evident that the situation presents an emergency which should be provided for by special appropriation of sufficient amount to complete the enrockment along the entire length of the threatened trestle, which appropriation should be made available in time to permit contracts to be made for an early start in the spring when good weather sets in.

2. To be more specific as to date it is desired to say that work should begin approximately on April 1, 1906, in case the emergency appropriation is made, and that therefore the funds or notice of their availability should be in possession of this office before March 15, 1906. This is on the supposition that ten days' notice to intending bidders on the rock would be sufficient If more notice must be given advice should be received at a correspondingly earlier date.

3. The above relates to the item of $400,000, which is referred to on page 10 of aforesaid report of December 2, 1905.

Very respectfully, your obedient servant,

S. W. ROESSLER,
Major, Corps of Engineers, U. S. Army.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 27, 1906.

MEMORANDUM.

The plan of improvement at the mouth of the Columbia River contemplates a single jetty extending seaward from the south side of the entrance. Work was begun in 1885 and was stopped in 1895, at which time the jetty had reached a length of 4¼ miles from high-water line at the point of junction with the shore, and the channel across the bar had attained somewhat more than the projected depth of 30 feet at mean low water. This depth, however, did not maintain itself, and in the course of five years had shoaled materially.

The river and harbor act of March 3, 1899, ordered a survey with a view of obtaining a channel 40 feet in depth. A project for this improvement was submitted by the local officer, and by direction of the river and harbor act of June 13, 1902, was referred to a board of engineers, which board recommended an extension of the jetty 2½ miles farther, and the trial of a sea-going suction dredge for temporary relief, and stated further that the construction of a north jetty might be necessary.

The most economical and perhaps the only practicable method of constructing jetties in this exposed locality is by first building a trestle carrying a railway along the line of the proposed work, upon which cars loaded with stone are run out and the stone dumped. As work has progressed the maintenance of this trestle railway has become more difficult from two main causes, of which the first was anticipated and was the increased exposure to wave and current action, and the second was entirely unexpected and arose from the destructive action of the teredo in the timber piling of the trestle. No action of the teredo in this locality had been experienced in the work from 1885 to 1895, and none in the later work prior to the summer of 1904.

Investigations made by the district officer in 1899 seemed to show clearly that the worms need not be feared on account of the great volume of fresh water discharged by the Columbia River. However, having now appeared, they must be expected every season, and in consequence every advantage should be taken of the trestle, so long as it is sound, to push the work. During the fall and winter of 1904–5 12,000 linear feet of the trestle were destroyed, due to the weakening caused by their action. This portion of the trestle was repaired and rebuilt this year, and it is probable that it will be available, with careful nursing, for work until July, 1906; but more than this can not be hoped for. Since the railway can not be rebuilt on the original line, owing to the impossibility of driving piles through the enrockment, the jetty should, if possible, be completed during the life of the trestle now standing, otherwise duplication on a parallel line, at much added expense, will be necessary.

The work is now in progress under an appropriation of $400,000 made by the river and harbor act of March 3, 1905, and a pledge of $300,000 additional to be furnished in the next sundry civil bill. When these two sums shall be exhausted there will remain a considerable amount of work to be done to complete the jetty under the trestle now standing, and to take advantage of this trestle the work should be finished by the first of next July.

It is stated by Maj. S. W. Roessler, Corps of Engineers, that this work, which he regards in the light of an emergency, will cost the sum of $400,000 in addition to the sums now appropriated and pledged. If no funds are made available for this purpose, duplication of work at great additional expense must necessarily result. Major Roessler outlines a plan for future extension of the jetty beyond the end of the existing trestle on the supposition that funds will be available to complete the work before the destruction of the latter. He estimates the total cost of completing the jetty, under the condition that no groins are found to be necessary to stop the scour, at $1,900,000, including the sum of $400,000, which he regards as an emergency requirement. If groins are found necessary, this total sum will be increased. He also remarks upon the desirability of authorizing continuing contracts for the entire amount of the estimate. The division engineer dwells strongly on the advisability of making this entire sum available at once.

The excess in cost of the jetty over the original estimate is due, first, to the action of the teredo in causing the destruction of much of the completed trestle and in requiring that the subsequent trestles shall be built in a much more costly manner, and, second, to the additional amount of rock in the jetty, made necessary by the scour along the same. A cross section of the jetty submitted with Major Roessler's report shows that in water originally 28 feet deep the erosion at the foot of the side slopes on the channel side is about 10 feet and on the sea side about 5 feet since the time of the survey upon which the estimate was based, thus increasing greatly the quantity of rock required in the structure.

It is my opinion that unless an appropriation of $400,000, in addition to the $300,000 to be provided in the sundry civil bill be made available at the present session of Congress, great loss to the work will result. I can not measure this loss in dollars and cents. It will amount not simply to a delay in the work, but may result in an enforced duplication of a large part of the portion now built, unless that portion can be completed during the life of the present jetty trestle. The extreme emergency of the case extends only to that particular feature of the work. Beyond the sum named, additional appropriation or authorization at the present session of Congress is very desirable in the interest of the economical prosecution of the work, and would be, in my judgment, a wise measure; but the demand for such additional sums is not so imperative as is that for a sum sufficient to complete the jetty to the length of the present tramway.

As this work is one which has been already ordered by Congress, the fact that it can not be completed with the funds in hand and the amount which is immediately necessary as an emergency measure of relief, should, I think, be communicated to the chairman of the proper committee of Congress, and perhaps also the estimate for completing the work, since it required no survey to prepare this; but it is possible that it might occasion some embarrassment to make the last-named estimate public.

A. MACKENZIE,
Brig. Gen., Chief of Engineers, U. S. Army.

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